HITACHI

Stereo cassette tape deck

D-3300M

Operating guide

BEFORE USING

To obtain the best performance and ensure years of trouble-free use, please read this operating guide carefully.

FEATURES

- **ATRS (Automatic Tape Response System)**
  The microprocessor controlled ATRS unit incorporated in this deck automatically detects the optimum bias, equalization and recording level for any tape so that a flat frequency response is achieved with minimum distortion and the widest possible dynamic range. The results of the test, which takes 10 seconds, are held in memory and can be recalled whenever required.

- **2-motor - 3-phase uni-torque motor/DD motor**
  Stable speed and a wow and flutter of a low 0.023% (WRMS) by the use of a newly developed brushless, coreless, slotless 3-phase uni-torque motor to drive the capstans and a DC motor to drive the reel discs.

- **1.4mm close gap metal R & P combination head suitable for Metal Tape**
  A newly developed high density ferrite close-gap metal R & P combination head which can generate sufficient magnetic field for the high coercivity of Metal Tape is employed. In addition to the above, a special double-gap high hardness, high permability, special permalloy double-gap erase head is used to fully erase high coercivity tape. As a result, the excellent characteristics of Metal Tape are displayed such as the wide frequency response, extended high frequency dynamic range, reduced distortion at high input levels, sharp improvement of S/N ratio in the high frequency band, etc.

- **Digital peak meter with-2 colour and highly accurate level indication is used**
  The blue and orange graph corresponds to the strength of the input/output signal, and it is displayed as such.
  Since it has rapid speed of response, the display always indicates the peak level very accurately.
  Very accurate level setting is possible.
  The series indicatioin of both R/L channels enables the individual reading of left/right levels with ease, and checking the level is also easy.

- **Logic Control/Feather-touch buttons**
  The operation controls are feather-touch buttons; just touching them is enough, you don't have to press them. ICs in the logic circuit make it possible to change over directly from fast-forward and rewind to playback without damaging the tape. In the same way, you can change over from playback to fast forward or rewind without having to worry about damaging the tape.

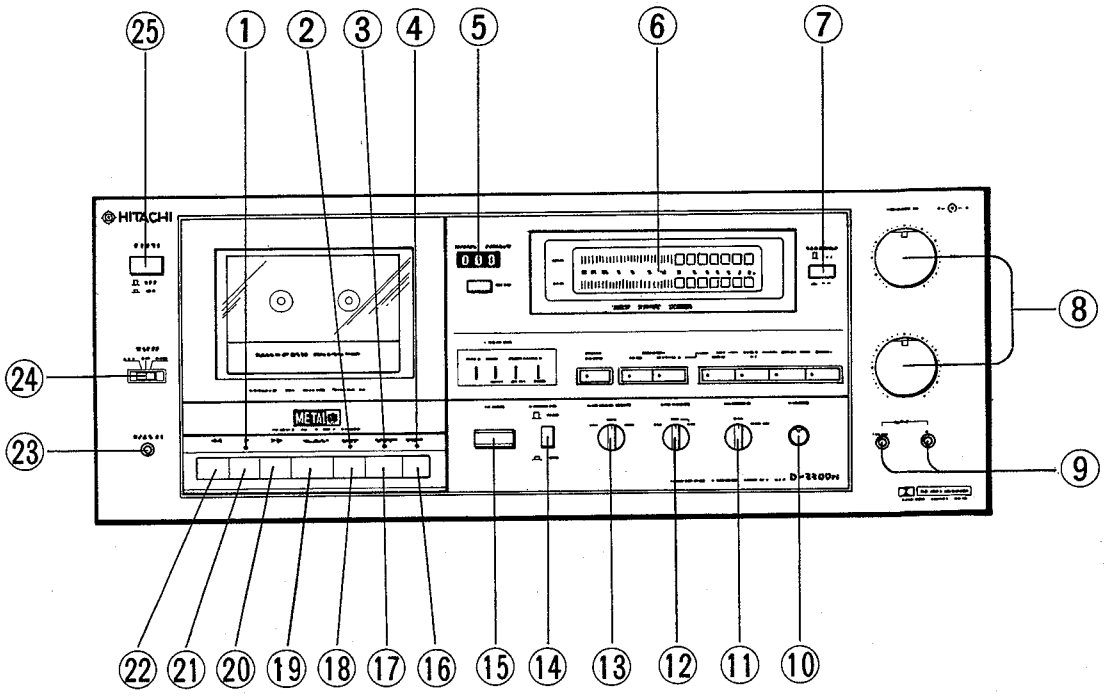
- **Double Dolby* Noise Reduction System**
  The Dolby NR system improves the signal-to-noise ratio by approximately 10 dB without affecting frequency response. With the double Dolby NR system used in this 3-head deck, when recordings are made with Dolby NR, they can be monitored after recording and are treated by the second Dolby NR circuit before being heard.

  * Noise reduction system manufactured under license from Dolby Laboratories. "Dolby" and the double-D symbol are trademarks of Dolby Laboratories.

- **Low noise FET amplifier**
  A low noise FET amplifier is used in the input stage to make further improvements in the S/N ratio; this also reduces noise in playback.
- **Dual capstan system**
  This further stabilizes tape speed and tape/head contact. Fluctuations in signal level caused by uneven tape transportation are eliminated.
- **REC/MUTE switch**
  Pressing this button during recording leaves blank sections on the tape. While the button is pressed the tape transport continues to operate but the signal is cut. Use it to leave gaps between recorded passages.
- **Auto-rewind play/stop facility**
  At the end of tape whether the tape is to stop or to be rewound, and if it is to be rewound, whether it is to stop after being rewound or enter the play mode, is selectable. This is very convenient if you want continuous background music at a party.
- **Remote control option**
  Remote control operation is possible using the optional remote control device (RB-2000).
- **Full auto-stop mechanism**
  When the tape reaches its end in any mode, the full auto-stop mechanism operates to switch off the mechanism so that the tape is not damaged.
- **Memory counter**
  If you set the counter to "000" before you start recording and the memory switch ON when rewinding, the tape will stop when the counter reaches "999" in the rewind mode. Rewinding to the start of a recording lets you listen to a recording immediately you have made it. Used together with the auto rewind mechanism, this makes flexible operation possible.
- **Equipped with a timer facility which can record when you are not at home and play back music to wake you up.**
  With an external audio timer connected, automatic recording at the desired time or playback of music as an alarm is possible.

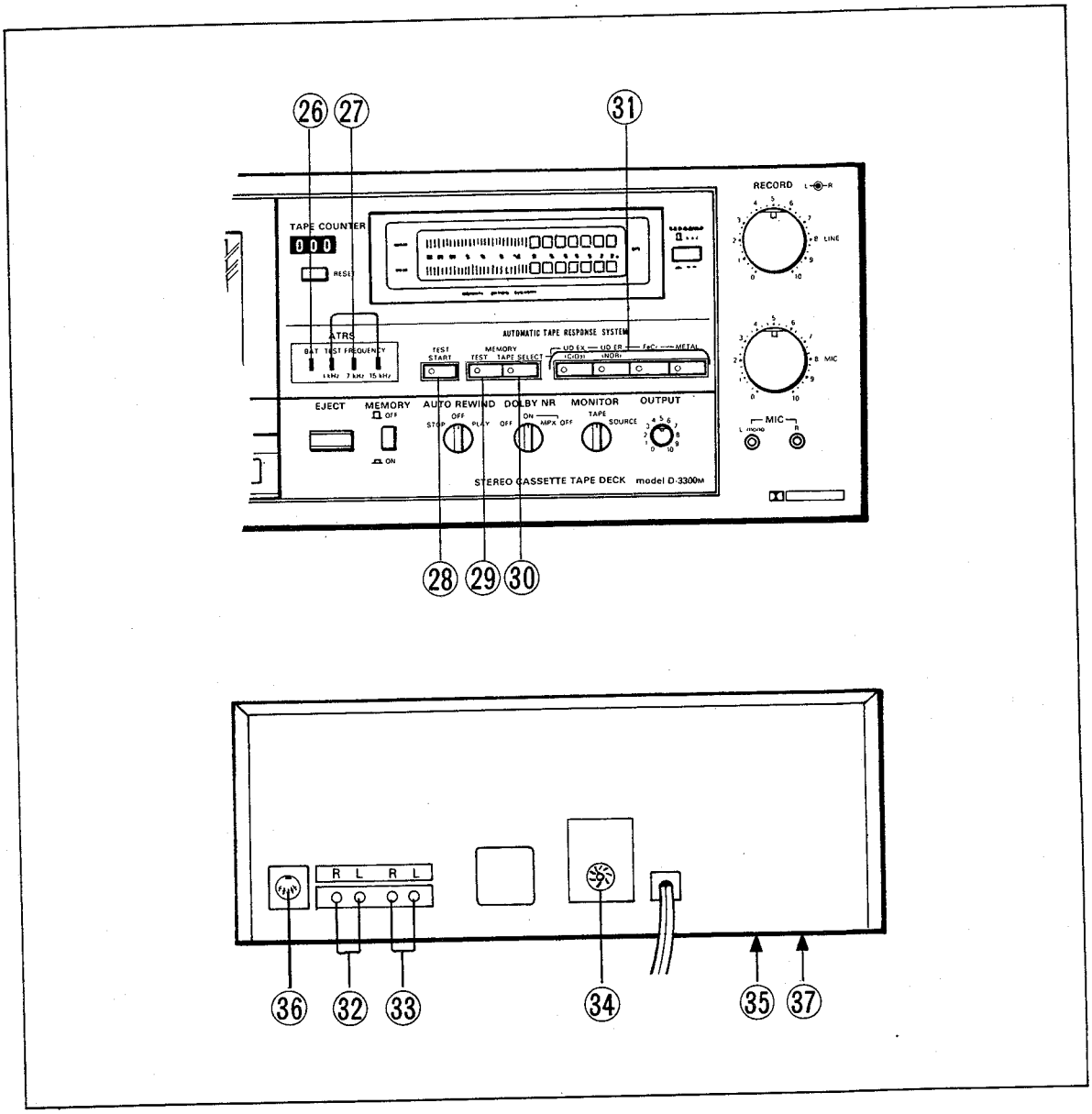
PRECAUTIONS

- This unit is designed so that other units can be stacked on it, but do not stack extremely heavy objects on it.
- Never use any strong detergent or solvent for cleaning the cabinet of this unit, because it could lead to damage of the surface finish.
- Protect the unit against excessive heat (e.g. direct sunshine), dust, shock hazards and moisture.
- Be sure not to open the cabinet.
- Be careful not to damage the power cord. Be sure to hold the plug when pulling it out; do not pull the cord.
- Disconnect the AC power (mains) cord plug from the AC outlet when the unit is not to be used for a long period of time or you are away from home.



KEY TO ILLUSTRATIONS

① PLAYBACK INDICATOR
② REC INDICATOR
③ PAUSE INDICATOR
④ REC MUTE INDICATOR
⑤ TAPE COUNTER (TAPE COUNTER)
⑥ DIGITAL PEAK LEVEL METER
⑦ PEAK HOLD SWITCH
⑧ RECORDING LEVEL CONTROLS (RECORD)
⑨ MIC JACKS (MIC)
⑩ OUTPUT LEVEL CONTROL (OUTPUT)
⑪ MONITOR SWITCH (MONITOR)
⑫ DOLBY NOISE REDUCTION SWITCH/MPX FILTER SWITCH (DOLBY NR)
⑬ AUTO-REWIND SWITCH
⑭ MEMORY SWITCH (MEMORY)
⑮ EJECT BUTTON (EJECT)
⑯ REC MUTE BUTTON (REC MUTE)
⑰ PAUSE BUTTON (PAUSE)
⑱ RECORD BUTTON (REC)
⑲ STOP BUTTON (STOP)
⑳ FAST-FORWARD BUTTON (▶▶)
㉑ PLAYBACK BUTTON (▶)
㉒ REWIND BUTTON (◀◀)
㉓ HEADPHONE JACK (PHONES)
㉔ TIMER SWITCH
㉕ POWER SWITCH



㉖ BATTERY INDICATOR (BATT)
㉗ TEST INDICATORS
㉘ TEST START BUTTON (TEST START)
㉙ TEST MEMORY BUTTON
㉚ TAPE SELECT MEMORY BUTTONS
㉛ TAPE SELECT BUTTONS
㉜ INPUT JACKS (LINE IN)
㉝ OUTPUT JACKS (LINE OUT)
㉞ REMOTE CONTROL JACK
㉟ MEMORY BACK-UP BATTERY HOUSING
㊱ DIN (REC/PLAY) JACK
㊲ VOLTAGE SELECTOR

PEAK HOLD SWITCH
The peak level can be held using this switch.

REC MUTE SWITCH (REC MUTE)
When this switch is pressed during recording, the tape continues running but no signal is recorded.
This is convenient so as not to record commercials, etc. and to leave gaps between recordings.

DOLBY NOISE REDUCTION SWITCH/MPX FILTER SWITCH (DOLBY NR)
Set this to the appropriate position.
ON/MPX OFF: For recording program sources other than FM broadcasts via Dolby NR circuit or to play back tapes recorded via Dolby NR circuit.
ON/MPX ON: For recording FM broadcasts via Dolby NR circuit.
OFF: For recording or playing back without Dolby NR circuit and for playing back tapes recorded without Dolby NR.

MONITOR SWITCH (MONITOR)
Since a 3-head system is used in this unit, the recorded signal can be played back immediately after it has been recorded.
TAPE: Sounds recorded on the tape can be monitored as playback sound via the amp.
*Be sure to set the switch to "TAPE" for playback.
When it is set to "SOURCE", no sound will be heard.
SOURCE: The source sound can be monitored.

RECORDING LEVEL CONTROLS (RECORD)
These knobs adjust the recording levels of the left/right channels of the source to be recorded.
MIC: For recording from the microphones jacks (MIC) or DIN (REC/PLAY) jack.
LINE: For recording from the input jacks (LINE IN).

OUTPUT LEVEL CONTROL (OUTPUT)
This is used to adjust the output levels of the output jacks (LINE OUT) and the headphones.
For convenience, use this control to set the output to the same level as that of the tuner, etc.; thereafter control the output volume with the amplifier's controls.

AUTO-REWIND SWITCH (AUTO REWIND)
This switch is used to select the operation at end of tape.
STOP: The tape is automatically rewound to the tape start and the deck enters the stop mode.
OFF: The deck enters the stop mode.
PLAY: The tape is automatically rewound to the tape start and the deck enters the playback mode when rewind is completed.

MEMORY SWITCH (MEMORY)
Press the reset button of tape counter ⑤ to set it to "000" when starting the recording. When the tape is rewound with this switch set to "ON", the tape automatically stops when the counter reaches "999".

TEST START BUTTON (TEST START)
Press this button for testing using the ATRS.

TEST INDICATORS
In testing, as test progresses the 1 kHz, 7 kHz and 15 kHz indicators light in sequence.

BATTERY INDICATOR (BATT)
This flashes when the memory back-up batteries are exhausted.

TEST MEMORY BUTTON
Press this to recall the data for the last tape tested.

TAPE SELECT MEMORY BUTTON
Press this to use the tape select memory.

TAPE SELECT BUTTONS
Press the button corresponding to the tape being used for recording and playback.

MEMORY BACK-UP BATTERY COMPARTMENT (BOTTOM PANEL)
When the battery indicator starts flashing, the 2 silver oxide batteries should be replaced.

TIMER SWITCH (TIMER)
Set the switch to OFF when using the unit normally.
Set this switch to REC or PLAY for recording when you are absent or for timer PLAY.

POWER (MAINS) REQUIREMENTS

To Set Power (Mains) Voltage:

1. This unit can be used with a power (mains) voltage of 100 to 110V, 115 to 127V, 200 to 220V or 230 to 250V. Before operating, be sure to check your local power (mains) voltage.
   The Voltage selector has been set to 230 – 250V when the set is shipped from the factory.
2. Turn the Voltage selector to your local power (mains) voltage with a screwdriver until the selector clicks.

Notes: 1. Before turning the selector, disconnect the AC power (mains) lead from the AC outlet with this unit in the stop mode.
2. Be sure not to turn the selector with a thin screwdriver, etc. by force. The selector may be broken and the deck will not operate.
3. When inserting the mains plug into the AC outlet supplying 100 – 110/115 – 127V, insert the plug with a Siemens adaptor connected to it.

CONNECTION TO YOUR STEREO SYSTEM

Connect the deck to your stereo system using pin cords.

PLAYBACK: Connect the Output jacks ㉝ of this deck to the playback jacks (TAPE PLAY) of your stereo amplifier.

RECORDING: Connect the Input jacks ㉜ of this deck to the recording jacks (REC OUT) of your stereo amplifier.

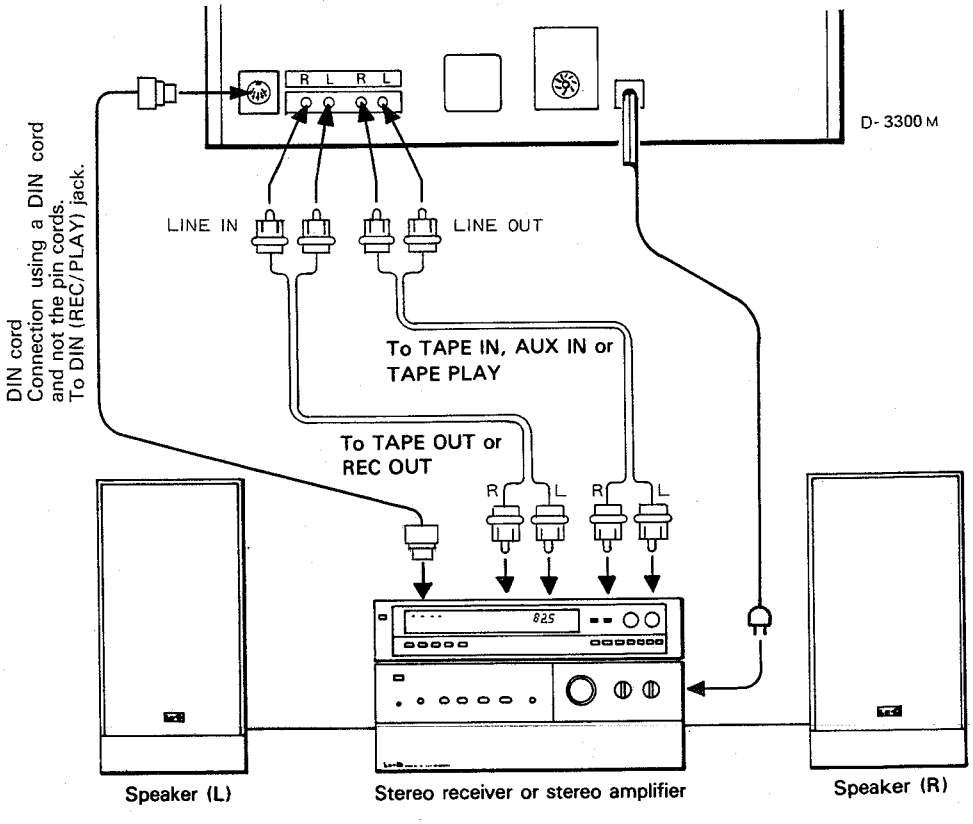
Do not confuse L and R when connecting.

(The left channel of this deck must be connected to the left channel of the stereo system, etc.)

Recording and playback can be done with a single DIN cord.

Cautions:

* Do not use a DIN (REC/PLAY) cord and pin cords simultaneously. (This may cause abnormal noise to be generated.)
* Be sure to switch off the power before connecting or removing the input/output cords.
* Do not connect a DIN (REC/PLAY) jack to another tape deck with a DIN (REC/PLAY) jack using a DIN (REC/PLAY) cord.


DIN cord
Connection using a DIN cord and not the pin cords.
To DIN (REC/PLAY) jack.
R L R L
D-3300M
LINE IN
LINE OUT
To TAPE IN, AUX IN or TAPE PLAY
To TAPE OUT or REC OUT
R L R L
Speaker (L)
Stereo receiver or stereo amplifier
Speaker (R)

IMPORTANT NOTICE

When using with other components, any component which can produce induction noise which can induce hum should be as far as possible from this deck. Bias leakage from this deck during recording may cause beats during reception of AM broadcasts, so be carefull in position of this deck with respect to the tuner; when beats occur, move them away from each other if possible.
There is no problem in FM reception.

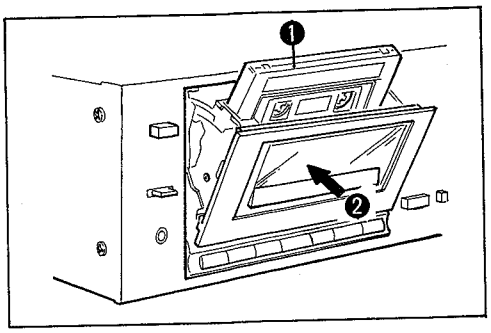
HOW TO INSERT THE CASSETTE TAPE

When the Eject button ⑮ is pressed, the cassette holder gently comes out. Insert the cassette tape into the cassette holder with the edge where the tape is visible down as shown by arrow ❶ and press it in the direction of arrow ❷ until it is locks with a click and then close the cassette lid.

Caution:

Close the cassette lid carefully and correctly after loading the tape.

Be gentle when inserting the cassette tape; do not close the lid too quickly.



HOW TO TAKE OUT THE CASSETTE TAPE

When the Eject button ⑮ is pressed in the stop mode, the cassette tape holder comes out and the cassette tape can be taken out.

Caution: To protect the mechanism, do not press the Eject button ⑮ during operation.

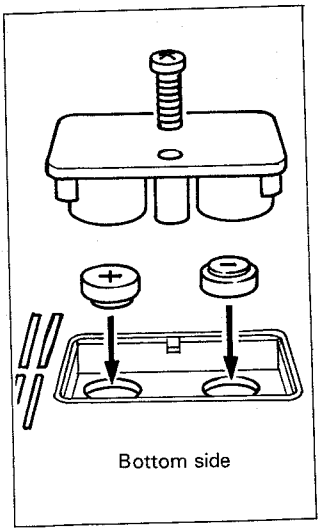
For loading and unloading the cassette tape, press the Stop button ⑲ first to enter the stop mode before pressing the Eject button ⑮.

BATTERY REPLACEMENT

2 silver oxide batteries (G-13) are used for this unit to back-up the memory of the microprocessor.

Be careful of the following when replacing batteries.

1. Be sure to replace batteries with the power switch set to ON and the power cord connected.
2. The unit may not operate normally if the batteries are replaced with the power switch set to OFF. If this happens, pull out the batteries with the power switch set to OFF and insert the batteries once more with the power switch set to ON.
3. When replacing batteries, insert them without confusing polarity ((+) and (−)).



RECORDING

Recording from a stereo system

1. Connect this unit and the stereo system using US-pin type cords.
2. Set the Power switch ㉕ to ON, insert the cassette with the side to be recorded toward you and close the cassette holder.
3. Change over the Dolby noise reduction/MPX filter switch ⑫ to match the source to be recorded.
   (Set to "ON" for FM stereo recording and to "ON/MPX OFF" otherwise. Set to "OFF" to record without using the DOLBY NR circuit).
4. Set the Auto-rewind switch ⑬ to the desired position (Refer to "Auto-rewind switch" on Page 19) and press the reset button of Tape counter ⑤ so that the reading is "000".
5. Set the Monitor switch ⑪ to "SOURCE".
6. Change over the Tape select buttons ㉛ to match the tape.
7. Set the unit to the recording stand-by mode by pressing simultaneously the Record button ⑱ and the Pause button ⑰. Adjust the Recording level controls ⑧ so that the indicator of the Digital peak meter ⑥ do not exceed +3 dB at maximum input.
8. Start recording by pressing the Playback button ㉑.
9. When it is desired to stop recording temporarily, press the Pause button ⑰. Press the Playback button ㉑ to continue recording.
10. Press the REC. MUTE button ⑯ to cut the sound being recorded.
    The input is cut while the button is pressed and restarts when the button is released. (Use the Pause button ⑰ when the narration is too long, etc.).
11. Press the Stop button ⑲ when the recording is completed.
    When the recording is done up to the end of tape, operation is according to the position of the Auto-rewind switch ⑬.

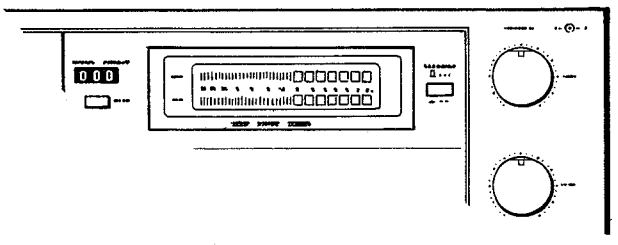
Caution: Do not push the Power switch ㉕ ON/OFF abruptly during recording as it may cause mis-operation.

To record using ATRS

Refer to the section on ATRS on page 11.

Adjusting the recording level

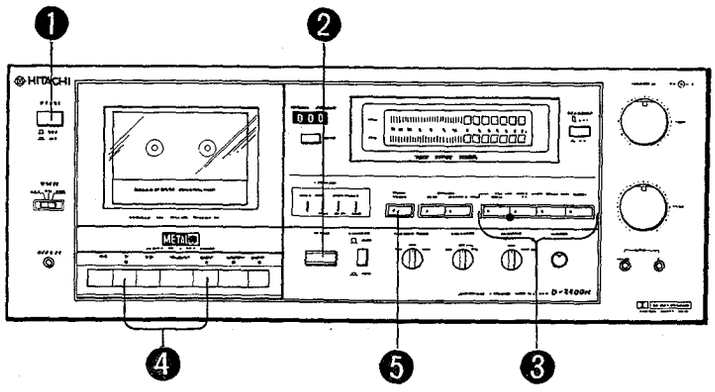
Adjust the recording levels of the two channels independently: the outer knob controls the right channel and the inner knob controls the left channel.
Adjust the recording level while watching the peak level meter. When recording sound with a fairly constant level such as a narration, adjust so "0"is not exceeded. When recording sound such as music where instantaneous peaks occur, adjust so that the level does not exceed "+3".



ATRS (Automatic Tape Response System)

The D-3300M incorporates the innovative ATRS using a microprocessor which makes it possible to achieve the best possible performance from any tape.
The optimum bias, equalization and recording sensitivity of any particular tape are detected so that recording and playback with any tape has optimum frequency response, minimum distortion and the most stable output level possible.
ATRS is not used in the play mode.

• ATRS operation



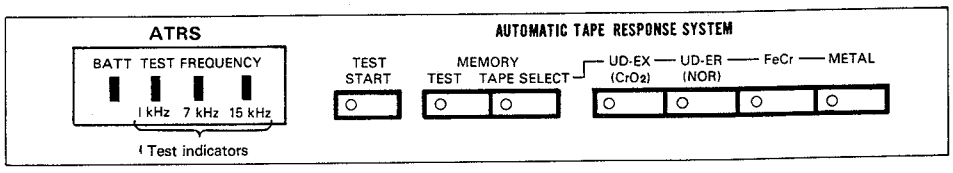
1. Turn ON Power switch ㉕.
2. Press the Eject button ⑮ and insert a cassette tape.
3. Press the Tape select button ㉛ corresponding to the tape.
4. Press the Record button ⑱ and the Playback button ㉑ to set the deck to the recording mode.
5. Press the Test start button ㉘. (To obtain precise data for any tape, do not test at the beginning or end but use the middle of the tape.)

6. Now ATRS operation starts. It takes about 10 seconds for ATRS to test the tape, after which the tape is rewound to the position at which the test started, and the deck enters the stop mode with the test data stored in memory.
7. Adjust the level with the Recording level controls ⑧ then press the Record button ⑱ and Playback button ㉑ simultaneously to start recording with optimum bias and equalization.

• ATRS cautions!

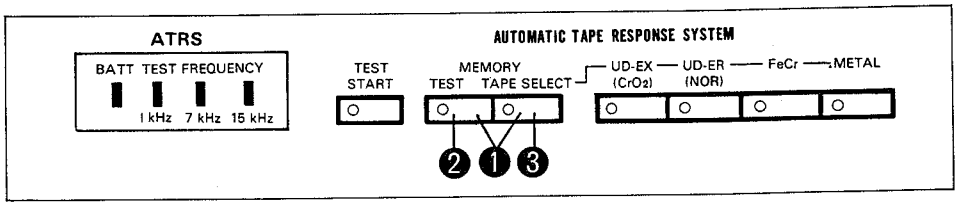
- The Tape select buttons ㉛ are inoperative once the test has started. Be sure to press the correct one before the test.
- Use the middle of the tape for optimum ATRS testing. Be careful not to use the leader tape for testing. If the leader tape or bad (worn, non-standard) tape is used for ATRS testing, precise data cannot be obtained so that ATRS's operation is automatically stopped, the TEST START lamp starts flashing to indicate an error and the deck enters the stop mode.
- When the operation button is pressed during ATRS testing, ATRS circuit releases and the mechanism operation has priority.

• **ATRS test data**



It takes ATRS about 10 seconds to detect the optimum bias and equalization; while it is progressing the Test indicator lights successively. After testing, the ATRS test data is stored in memory corresponding to the type of tape. Data can be stored for one type of CrO_2 (UD—EX) tape, one type of normal (UD-ER) tape, one type of ferrichrome (FeCr) tape and one type of Metal Tape. When testing is performed for any type of tape, the data already held in memory for that type of tape is overwriten.
To use the data obtained by ATRS immediately after it has been used, press the Test memory button ㉙. To use data obtained previously held in memory, press the Tape select button corresponding to the type of tape being used. When a Tape select button is pressed, the indicator corresponding to the button lights so that it can be checked that data is being used. If a Tape select button is pressed and no data is held in the corresponding memory, indicator of Tape select memory button ㉚ flashes to warn that ATRS testing must be performed.

• **Storing test data**



To store ATRS test data in the tape select memory:
1. Press the Tape select memory button ㉚ while pressing the Test memory button ㉙.
2. Release the Test memory button ㉙.
3. Release the Tape select memory button ㉚.

This operation can be performed for each of the four types of tape. When it is done again for a previously tested type of tape, the data in memory is overwritten by the new data.
A fifth set of data obtained from ATRS testing can be held in the test memory without performing the operation given above.

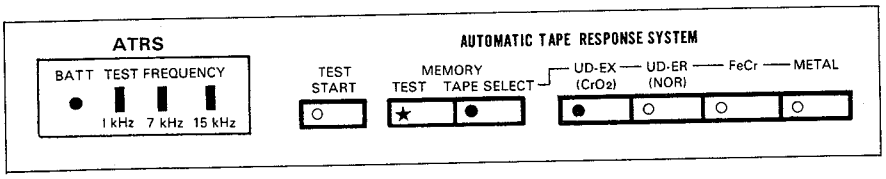
• **Accessing test data**

To use the data stored in test memory for recording:
Press the same Tape select button ㉛ used in testing, then press the Test memory button ㉙. The Test memory indicator lights to indicate that data has been output.
To use the data stored in the Tape select memory for recording:
Press the Tape select button ㉛ corresponding to the type of tape used. Check that the Tape select memory button ㉚ indicator lights.
When Test memory button ㉙ indicator lights, press the Tape select memory button ㉚.

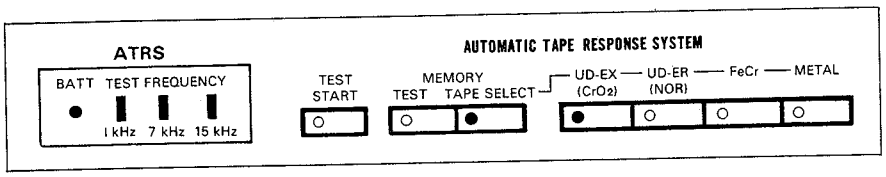
Notes: 1. When the Tape select memory indicator flashes, it shows that no data is stored for the type of tape being used and that ATRS testing must be performed.
2. Be careful; if the Test memory button is pressed by mistake instead of the Tape select memory button, the test memory data overwrites the data in the Tape select memory.

ATRS operation buttons and indicators

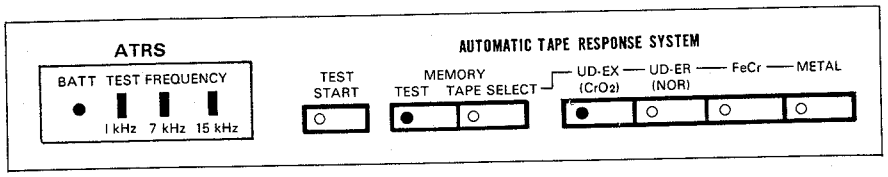
★ flashing
● lit



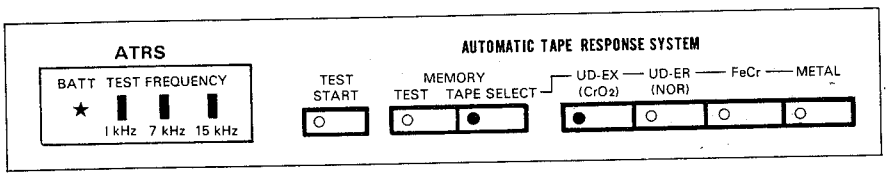
Test error indication
ATRS test is performed with leader tape.
➡ Test using the middle of the tape.



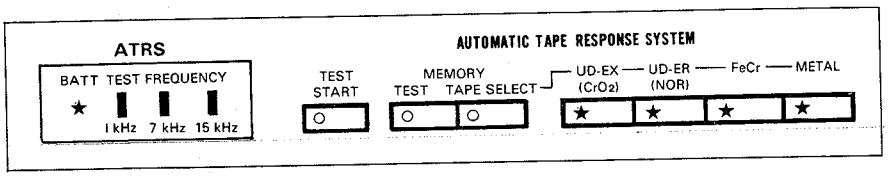
Data for CrO_2 (UD-EX) tape select memory output



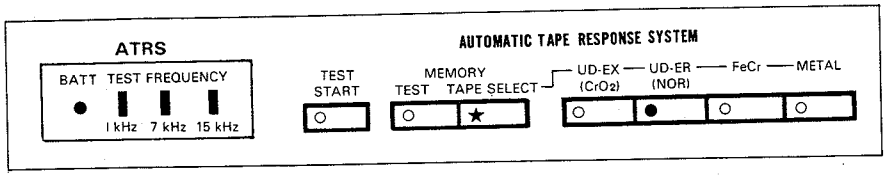
ATRS testing of CrO_2 (UD-EX) tape is completed and the resulting data is output.



Memory back up batteries exhausted (with data)
➡ Replace batteries



Memory back up batteries exhausted (without data)
➡ Mechanism will not operate.
➡ Replace batteries.



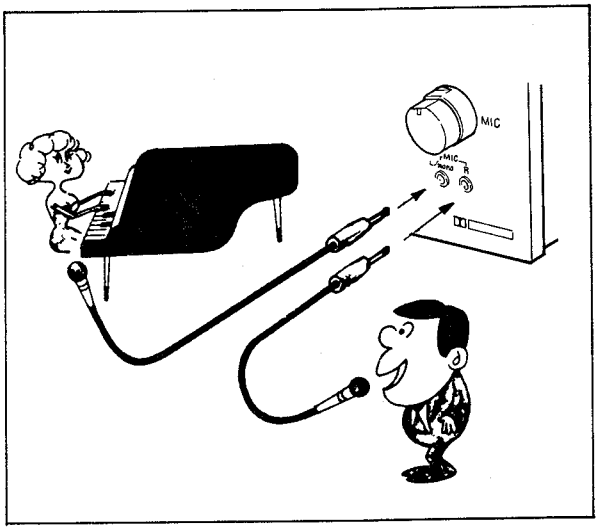
No test data stored for normal (UD-ER) tape
➡ Perform ATRS testing and store data for normal tape.

RECORDING USING MICROPHONES

Insert 2 microphones (optional) into the Microphone jacks ⑨. Operation is as described in "Recording from a stereo system" on page 10.
Adjust the recording level with the Recording level controls ⑧.

- To record with a single microphone (Monaural recording), insert it into the "L/Mono" Microphone jack ⑨, and the same signal will be recorded on both L/R channels simultaneously.

Caution: Be sure to pull out the microphone plugs when not recording from microphones.



MIXING RECORDING

The "LINE and "MIC" recording controls are independent, so music from the stereo system and the sound from the microphone can be recorded simultaneously. To adjust the recording levels, balance the sound using both the "LINE" and "MIC" Recording level controls ⑧.

Caution: When not making mixing recordings, set the control ⑧ not being used to its minimum position (0).

Monitoring during recording
Since the recording head and playback head of this deck are independent from each other, the original sound being recorded can be heard with the monitor switch in the "SOURCE" position and the recorded sound can be heard with the switch in the "TAPE" position. The optimum recording level and tone quality deterioration because of dirt on the heads can be checked.
When monitoring sound from speakers

- Set the monitor switch of the amplifier to "TAPE" and change over the monitor switch of this deck.
- Set the monitor switch of this deck to "TAPE" and change over the monitor switch of the amplifier.

Continuity recording
When you want to record without stopping the tape when playing back the tape, press the Record button ⑱ while pressing the Playback button ㉑, and recording will start.

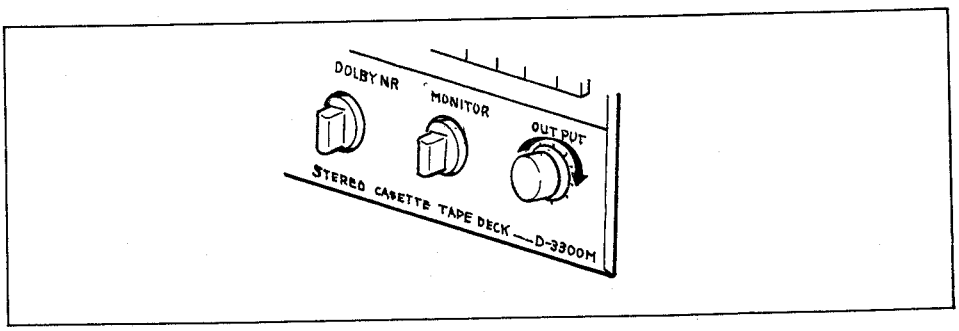
HOW TO PLAY BACK

1. Turn the Power switch ㉕ ON and insert the tape to be played back.
2. Set the Monitor switch ⑪ to TAPE.
3. Set the Dolby noise reduction/MPX filter switch ⑫ to "ON/MPX OFF" or "OFF" depending on whether or not the tape was recorded with Dolby NR system.
4. Set the Auto-rewind switch ⑬ to the desired position.
5. Change over the Tape select buttons ㉛ matching the tape.
6. Press the Playback button ㉑ to start playback. Adjust volume, tone and balance with the stereo amplifier controls.
7. When it is desired to stop the tape during playback, press the Pause button ⑰. Press the Playback button ㉑ to start playing again.
8. Press the Stop button ⑲ when playing is completed. When the tape is played up to the end, operations will depend on the position of the Auto-rewind switch ⑬.

OUTPUT LEVEL CONTROL

Set the volume control of the stereo amplifier to the position used when listening to broadcasts or records and then operate the deck and adjust this output level control to obtain the same sound level.

Caution: Sound does not come out when this Output level control ⑩ is in its minimum position. Sound may not come out when the stereo system is operated incorrectly, so read this manual together with the instruction manual of the stereo system.



FAST-FORWARD AND REWIND

Fast-forward

Press the Fast-forward button ⑳, and the tape is wound up quickly. Press the Stop button ⑲ to stop the tape.

In the case of fast-forward, when the tape reaches its end, the deck enters the stop mode automatically regardless of the position of the Auto-rewind switch ⑬.

Rewind

Press the Rewind button ㉒, and the tape is rewound quickly. Press the Stop button ⑲ to stop the tape. In the case of rewind, when the Auto-rewind switch is set to "PLAY", the unit enters the play mode automatically after the tape is rewound. When the Auto-rewind switch ⑬ is set to "STOP" or "OFF", the deck automatically stops.

HOW TO USE THE COUNTER MEMORY SWITCH

Press the reset button of the Tape counter ⑤ at the start of the desired section, to set to "000". Turn the Memory switch ⑭ ON, and press the Rewind button ㉒ after recording or playback is complete, then the deck stops automatically when the tape counter reaches around "999".

USE IN CONJUNCTION WITH THE AUTO-REWIND SWITCH

When you record from the middle of the tape and want to play back the tape to listen to what you have recorded, or when you want to listen to the tape from midway to the end repeatedly, use the Auto-rewind switch ⑬ together with the memory switch. Press the reset button of the Tape counter ⑤ to set it to "000" and set the Memory switch ⑭ to "ON", and the Auto-rewind switch ⑬ , to "PLAY" before recording or playing.

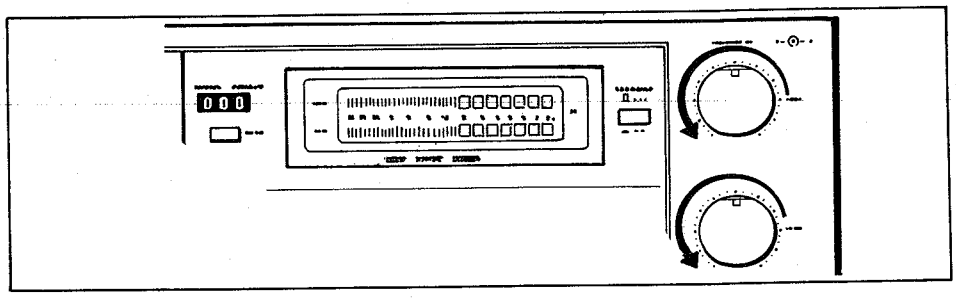
Caution:

- When the tape is rewound, the tape stops a little before the tape counter reaches "000" (around "999"); this is so that the beginning of the program is not missed.
- Press the Rewind button ㉒ once more when you want to rewind the tape further than the position "000".
- If the Rewind button ㉒ is kept depressed when the tape counter reaches "999", the memory switch will not operate. This is because the unit is in the rewind mode after "999" is passed.

ERASING

When a new recording is made onto a recorded tape, the signal previously recorded is erased automatically. When it is desired to erase a previous recording before making a new recording, the following procedure is necessary.

1. Insert the cassette tape with the side you want to erase towards you.
2. Match the Tape select button ㉛ to the tape to be erased.
3. Set the MIC and LINE Recording level controls to "0".
4. Press the Playback button ㉑ while pressing the Record button ⑱. Now, erasing starts.
5. When the tape is completely wound, the auto-stop mechanism stops it automatically.
   Press the Stop button ⑲ when it is desired to stop the tape midway.



When erasing is performed with the Recording level controls ⑧ set to minimum,there is generally no problem; when you want to erase with less noise, remove the input cords, etc. before erasing.

*Erasing both sides of the tape simultaneously can be done easily using a cassette demagnetizer.

RECORDING AND PLAYBACK USING AN EXTERNAL AUDIO TIMER

When this tape deck is used with an external audio timer, timer recording or playback at the desired time is possible.

TIMER RECORDING OF RADIO BROADCASTS

1. Insert the power cord of this unit into the socket of the amplifier. (Insert the power cord of the amplifier into the socket of the timer.)
2. Set the timer to the desired time.
   (Refer to the instruction manual of the timer for setting the time.)
3. Turn the power for the amplifier and tuner ON.
4. Operate as described in items 1 — 7 in "RECORDING".
5. Set the Auto-rewind switch ⑬ to OFF or STOP.
   Note: Do not set the Auto-rewind switch ⑬ to "PLAY" during timer recording.
6. Set the Timer switch ㉔ to "REC".

Note: If this switch ㉔ is set to "PLAY" and the timer functions, the deck enters the playback mode, so recording cannot be done. when it is set to "OFF", the deck does not operate at the set time.

(Now, preparation is complete)

7. Recording starts automatically at the set time, the timer operates and the power is switched on.

TIMER PLAY

1. Insert the tape you desire to playback, adjust the volume knob of the amplifier to determine the level and press the Stop button ⑲.
2. Connect the timer in the same way as in "Timer recording of radio broadcasts" and set the timer to the desired time.
3. With the Timer switch ㉔ set to "PLAY", Playback starts automatically at the set time.

CAUTIONS

- Do not use a cassette with its erasure prevention tabs snapped. When a cassette with its tabs snapped is used, the unit operates in the PLAY mode when the timer operates.
  Be careful because the chance to make a unique recording might be missed.
- Be sure to set the Timer switch (TIMER) to "OFF" except for TIMER recording/playback. When the timer switch (TIMER) is set to REC or PLAY, recording or play starts automatically a few second after the power switch is turned ON.
  Be careful when the erasure prevention tabs are present the previously recorded tape will be erased. Do not open/close the cassette lid for several seconds after the power is switched ON to protect the mechanism.

CAUTION ON USE OF TIMER

Do not use timer recording or playback when you are absent for a long time.

TAPE SELECT BUTTON

Refer to the following table for setting for different types of tape. Since this deck has been adjusted using HITACHI tapes, it is recommended that these are used to display the deck's full performance capabilities.

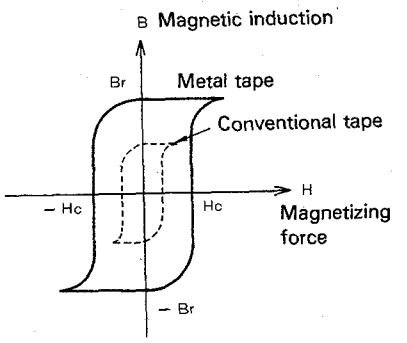
BRAND NAME	TAPE NAME	TAPE SELECT BUTTON			
		FeCr	UD-ER (NOR)	UD-EX (CrO_2)	METAL
HITACHI	DL		●		
	UD		●		
	UD-ER		●		
	UD-EX			●	
	ME				●
MAXELL	UL		●		
	UD		●		
	XL-I		●		
	XL-II			●	
	MX				●
SONY	BHF		●		
	AHF		●		
	DUAD	●			
	JHF			●	
	METALIC				●
FUJI	FX-I		●		
	FL		●		
	FX-II			●	

BRAND NAME	TAPE NAME	TAPE SELECT BUTTON			
		FeCr	UD-ER (NOR)	UD-EX (CrO_2)	METAL
TDK	D		●		
	AD		●		
	ED		●		
	SA (Improved)			●	
	MA-R				●
SCOTCH	MASTER I		●		
	High Energy		●		
	Dyna range		●		
	High lander		●		
	MASTER II			●	
	MASTER III	●			
	METAFINE				●
DENON	DX-3		●		
	DX-5	●			
BASF	fero Super LH II		●		
	fero Super LH		●		
	ferrochrom	●			
	Chrom Ox. super			●	
MEMOREX	MPX3 OXIDE		●		

METAL TAPE

Metal tape is coated with a magnetic material whose main components are malleable iron particles (Fe) on polyester base material.
With its superb magnetic characteristics, the frequency response of cassette decks is improved (especially, the dynamic range at high frequencies is widened), the maximum recording level is boosted and distortion is reduced.

Magnetization Curve of Tape (Hysteresis Curve)



Br: Residual magnetic flux density
Magnetic force remaining on tape (The stronger is it, the higher the signal level that can be recorded.)

Hc: Coercitive force
Values of H necessary for values of B to become zero (The higher they are, the wider the dynamic range at high frequencies, but the more difficult erasing the signal becomes.)

Cautions on the use of metal tape:

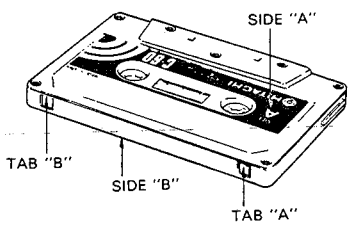
1. The coating of magnetic powder is not even with some Metal Tape causing level variation. It is recommended to carefully clean the heads, capstans and pressure rollers using a cotton bud moistened with alcohol after the unit has been used for several hours. Especially be careful when the ATRS testing is performed. (Be careful; when excessive force is applied to the head, it may cause deterioration of the high frequency response.)
2. Metal Tapes recorded using this deck can be played by other decks which do not have a Metal Tape switch position.
   Play back with the tape selector position set to Chrome (CrO_2) or FeCr at that time. Clean the tape running surface as in Item 1.

AUTO-REWIND SWITCH

This unit can automatically stop, rewind and play back depending on the position of the Auto-rewind switch. Set this switch for recording, rewinding and playing back to use it effectively.

Operation condition	Position of auto-rewind switch	Operation at the tape end
Recording	OFF	Stop (AUTO STOP)
	STOP	Rewind to Start ➡ Stop (AUTO STOP)
	PLAY	Rewind to Start ➡ Playback ➡ Rewind ➡ Playback ... Repetition
Playback	OFF	Stop (AUTO STOP)
	STOP	Rewind to Start ➡ Stop (AUTO STOP)
	PLAY	Rewind to Start ➡ Playback ➡ Rewind ➡ Playback ... Repetition
Rewind	OFF	Stop (AUTO STOP)
	STOP	
	PLAY	Playback ➡ Rewind ➡ Playback ... Repetition
Fast-forward	OFF	Stop (AUTO STOP)
	STOP	
	PLAY	

CASSETTE TAPES



Recording Protection: If the plastic tabs on the rear of the cassette are punched out (by a screwdriver or similar tool), the recordings can be protected against accidental erasure.
When only one side of the cassette is to be protected, with the side you want to protect up and the blank edge of the cassette towards you, punch out the tab on the right.

Precaution: If a tape is played several times continuously, especially if thin tape (C-90, C-120) is used, the tape might be wound too tightly on the reel and cause the tape speed to fluctuate. In order to avoid this, it is recommended to tap the cassette several times lightly against a table-top

which will loosen the tape on the reel. The tape should not be too loose. Especially after fast forwarding or rewinding a C-90 or C-120 cassette, the slack should be taken up by inserting a pencil or other object in the spindle hole and the tape tightened to prevent looping.

4-Track Record/Playback: After recording or playing back one side of the cassette, remove the tape by depressing the Eject button ⑮, turn the cassette over and insert it again. Then, the tape can be used again for the same time as the first side.

DOLBY® NR (Noise Reduction)

Due to the slow speed of cassette decks, tape hiss occurs. This is not audible at maximum output level but considerably degrades the playback quality of low level passages of recorded material. By using the Dolby NR system (named after the inventor), it is now possible to substantially reduce tape hiss so that it is practically inaudible during playback. With the Dolby NR system, during recording, the level of the low passages is increased considerably; during playback these passages are reduced to their original level. Therefore, the tape hiss is also reducted by the same amount and is not audible during playback.

Before playback of a cassette, it should be ascertained if the Dolby NR switch ⑫ is set in the proper position:

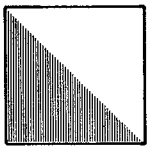
* Cassettes recorded through the Dolby NR circuit must be played back in the Dolby NR mode (if played back with normal playback equalization, the sound seems too sharp.)
* Normal recordings should not be played back through the Dolby NR system (if played back with the Dolby NR equalization, the sound will seem "muddy").

Generally, the optimum adjustment of the recording and playback calibration is important for satisfactory functioning of the Dolby NR system. This adjustment is done at the factory prior to shipment using calibrated test tape and special equipment.

Making an ordinary recording

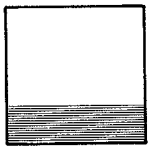
1. Music

Music is composed of sounds of different loudness separated by intervals of silence. Loud and soft sounds are here shown as long and short lines. The music shown in this diagram starts loud and gradually becomes very quiet.



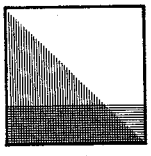
2. Noise

Any recording tape, even of the best kind, makes a constant hissing noise when played. At the very slow speeds and narrow track widths used in cassette tapes, tape noise is much more noticeable than it is in professional tape recordings, although even there it is a problem.



3. Music and Noise

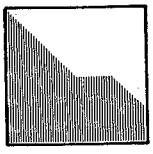
When a tape recording is played, noise from the tape obscures the quietest musical sounds and fills the silence when no sound should be heard at all. Only when the music is loud the noise is not usually heard; however, tape noise is so different from music that it sometimes can be heard even then.



Making Dolbyized recording

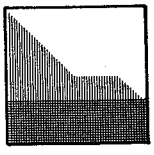
1. What the Dolby System does first

Before the recording is made, the Dolby System "listens" to the music to find the places where a listener might later be disturbed by hiss from the tape. This happens mainly during the quietest parts of the music. When it finds such a passage, the system automatically increases the volume so that music is recorded at a higher level than it would be normally.



2. The Recording

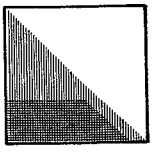
In a Dolby System recording the parts of the music which have been made louder stand out clearly from the noise. Thus recordings sound brilliant and unusually clear even when played back without the special Dolby System circuit.



3. What the Dolby System does during playback

When tapes are played on a high-fidelity tape deck equipped with the Dolby System circuit, the loudness is automatically reduced in all of the places at which it was increaseed before recording. This restores the music to its original level again.

At the same time, the noise which has been mixed with the music is reduced in level and this is by the same amount usually enough to make it inaudible.



ATRS (Automatic Tape Response System)

FEATURES of ATRS

1. Minimizes difference between recording and playback frequency response.
   Circuits are provided to vary bias as well as medium/low, medium and high frequency equalization under microprocessor control so that a flat frequency response is obtained for almost every type of tape.
2. With deviation between recording and playback sensitivity minimized, Dolby calibration is not necessary.
   The microprocessor compensates for variations in tape sensitivity so that variations in output are minimized and the frequency response does not vary when the Dolby noise reduction system is used.
3. Deterioration of distortion minimized.
   The recording bias is optimized for each tape so that distortion is never increased because of insufficient bias.
4. MOL (Maximum Output Level) is not degraded.
   The recording bias current is optimized so that the maximum output level is not degraded by inadequate bias.
5. Results of microprocessor calculations stored in memory.
   5 independent memories are provided so that data for five types of tape can be stored. The data is not lost when power is switched off because back up batteries are used. When the back-up batteries are exhausted, a warning indicator flashes.
6. Tape automatically rewound
   When the ATRS test is complete, the tape is rewound to the test start point and the test signal is completely erased.
7. Alarm indicators
   As well as the back-up battery indicator, alarm indications are given when the leader tape is used for testing and when there is no data in the memory selected.
8. ATRS indicators
   The frequency being tested is indicated so that the progress of the ATRS test can be seen at a glance.

OUTLINE OF ATRS

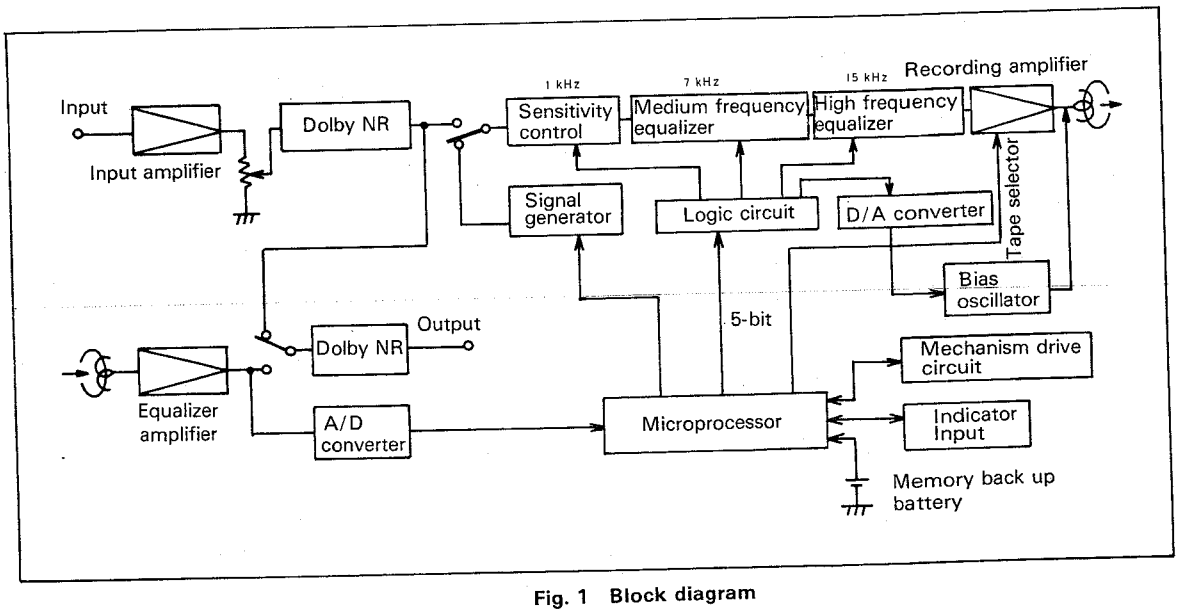


Fig. 1 Block diagram

Data is transferred from the microprocessor to peripheral circuits in 5-bit data units to control sensitivity, medium frequency equalization, high frequency equalization and bias in this sequence. The data passes through the logic circuit to control the functioning of the recording circuit. Fixed equalization values are provided for each type of tape (normal, chrome, ferrichrome and Metal) are selected with the tape select signal.
The microprocessor's memory is protected by the back-up batteries when power is switched off.

ATRS program

The ATRS program can be broken down into the following stages:

1. Interrupt processing
   When power is turned on, the microprocessor changes from the data protect mode to the execution mode. It outputs the data from the internal memory to the logic circuit and waits for instructions to be input. In this condition, recording is possible with the bias and equalization that were being used before power was switched off. If one of the tape select buttons is pressed, the data from the corresponding memory is output to the logic circuit.
2. Testing
   Fig. 2 is a flowchart of the testing process. With the deck set to the recording mode, the test start button is pressed and the deck enters the test mode.
   a) Adjusting to the optimum recording level.
      The signal generator shown in the block diagram outputs a1 kHz signal which is recorded. The recording level is adjusted so that it does not exceed the level specified by the microprocessor in subsequent adjustment of the bias and equalization values.
   b) Error check
      When recording is not possible (when the leader tape is used, etc.), an error is indicated.
   c) Setting optimum bias current
      The bias is varied from minimum to maximum while recording and playing back the reference signal to obtain the bias which gives the maximum playback output. Next the bias is varied from maximum to minimum to obtain the bias which gives the maximum playback output. The average of these two bias values is adopted as the optimum bias. By varying the bias through 32 steps, the optimum bias can be detected with high precision.

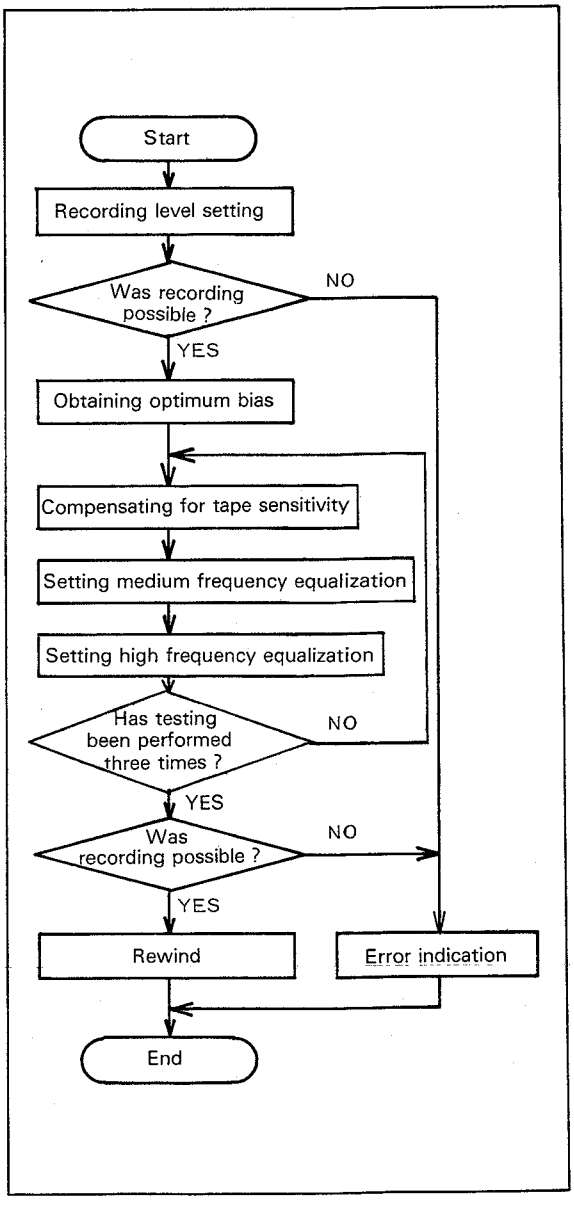


Fig. 2 Flowchart

d) Tape sensitivity and equalization are optimized by recording and playing back 1 kHz (sensitivity), 7 kHz and 15 kHz (equalizations) signals. In each of the tests 32 values of gain and equalization are used for precise adjustment.
This is done three times for improved accuracy.

e) Error check
The 1 kHz signal is recorded at the beginning and end of testing to check whether or not the ATRS test was performed correctly. When there is no playback output, an error indication is given.

f) Rewind, Stop
The counter inside the microprocessor counts the number of revolutions of the reel disc so that at the end of testing, the tape can be rewound to the test start position.
After ATRS testing, the data is held in test memory and can be transferred to the memory corresponding to the type of tape with a tape select button.
It is possible to perform this 32-step test within 10 seconds because the newly developed hyperbolic 1.4 mm Close Gap Metal R/P combination head.

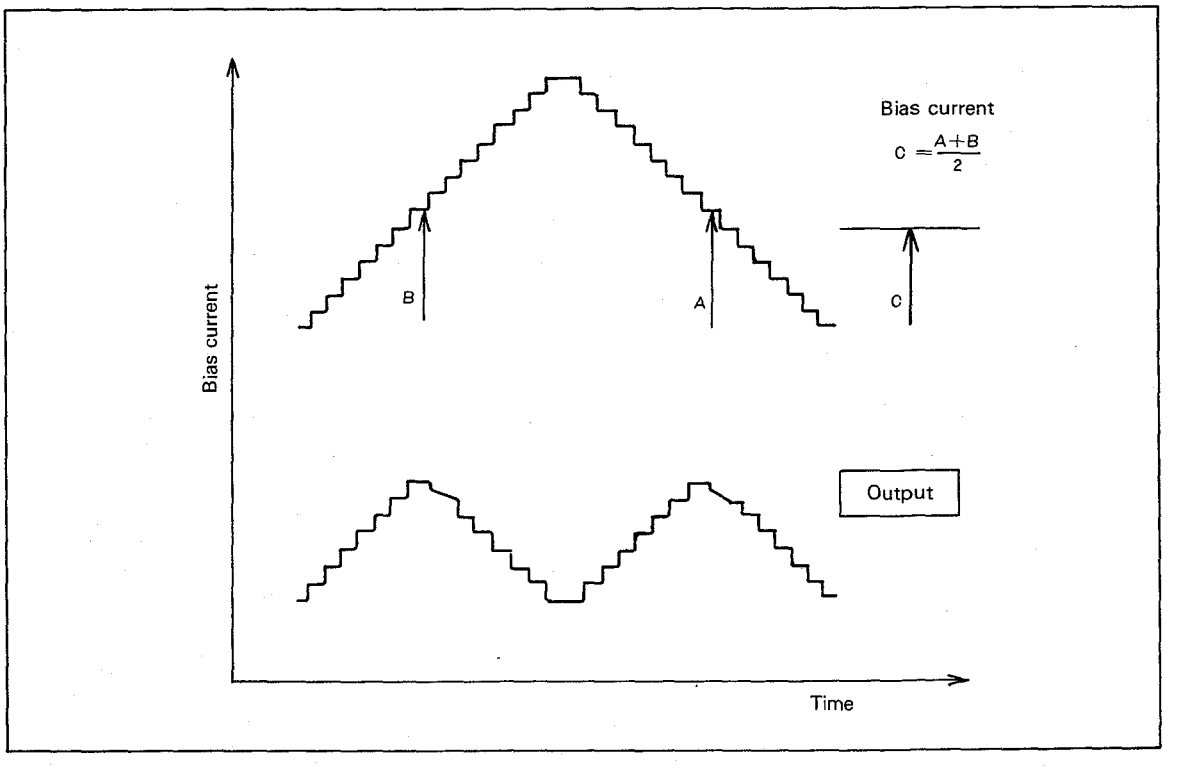


Fig. 3 Optimum bias current detection

UNI-TORQUE DD MOTOR

Uni-torque DD motor

The characteristics of the tape transport system of a cassette tape recorder are equally important to its electrical characteristics.
Hitachi employs a uni-torque direct drive motor to improve the performance of the D-3300M so that its wow and flutter is an amazingly low 0.023% WRMS and its mechanical performance equals the advanced electrical performance made possible by the ATRS.

- **Features of the new uni-torque motor**
  1. Torque ripple minimized
  2. Minimal wow and flutter
  3. Compact
  4. Long service life because of commutator-less
  5. Magnetic induction which can affect the playback head minimized

- **Principle of new uni-torque motor**
  Basically it is the same as a 3-phase AC motor. There are no coils on the stator or rotor; the drive coil is between them.
  This means that the magnetic field between the rotor and stator is the same whatever the position of the rotor, so that the torque is uniform.
  In this uni-torque motor, the drive system uses 3-phase alternating current so give a more even magnetic field which makes possible the 0.023% WRMS wow and flutter.

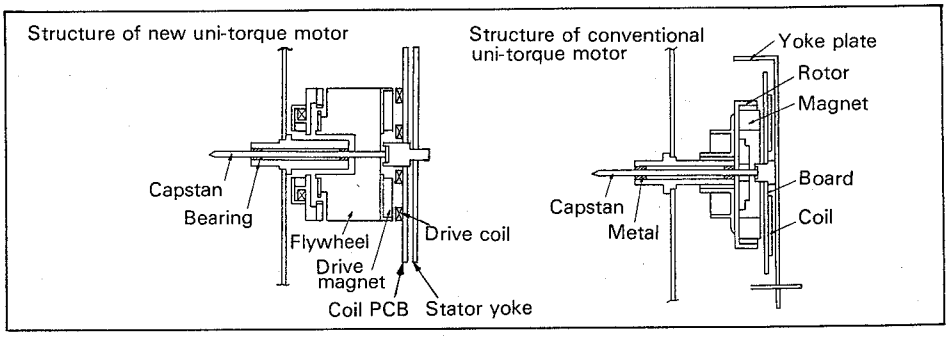


Fig. 4 Structure of uni-torque motor

TITANIUM MELT-INJECTION FINISH CLOSE GAP METAL R & P COMBINATION HEAD

The ideal magnetic head system would have a recording head which records a wide dynamic range signal with minimum distortion so that maximum output can be obtained in playback and a playback head that can detect the recorded signal effectively.
This is what Hitachi has tried to achieve with this new head.

1. Gap length was studied from various aspects including distortion, sensitivity, frequency response and signal-to-noise ratio before the recording gap length of 6.0 μ and narrow playback gap length of 1.0 μ were adopted.
2. After studying the technical possibilities, wow and flutter and tape contact with the playback head, it was decided to install the play and record heads in a single case. Good pad contact is made possible by keeping the spacing between the gaps 1.4 mm.
3. With the recording and play heads in a single case, magnetic crosstalk between the two heads tends to increase jumping and the leakage of bias noise. In this new head, the latest technology is used to suppress magnetic crosstalk.

4. Ferrite with its advantages of long service life, low dust adherence, high permeability and high density is used for the core. Titanium plasma melt/injection finishing is used to make it smooth so that a stable performance can be obtained. The head is hyperbolic so that tape/head contact is improved and recording and playback are possible with little level change.

D-3300M PERFORMANCE DATA

- Recording/Playback Frequency Response
  The type of tape is selected using a tape select button and sensitivity and equalization data are output from the microprocessor to the recording amplifier. This data can be obtained from a previous ATRS test and can be updated by ATRS testing at any time. Fig. 5-1 shows the characteristics obtained from the ATRS testing of UD-ER tape; as you can see, the response is flat. Fig. 5-2 shows the characteristics of a tape made by another maker both before and after ATRS testing. As you can see, before ATRS testing it has 2 dB less sensitivity and an upper limit to frequency of 15 kHz, 6 dB lower when compared with the results achieved after ATRS testing when the response is flat.

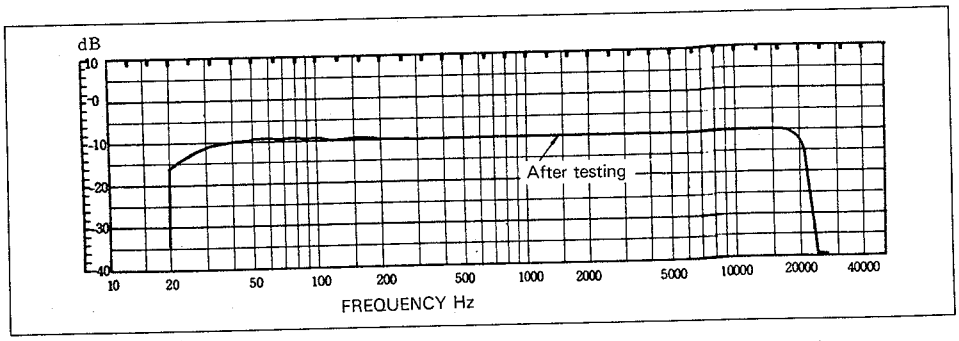


Fig. 5-1

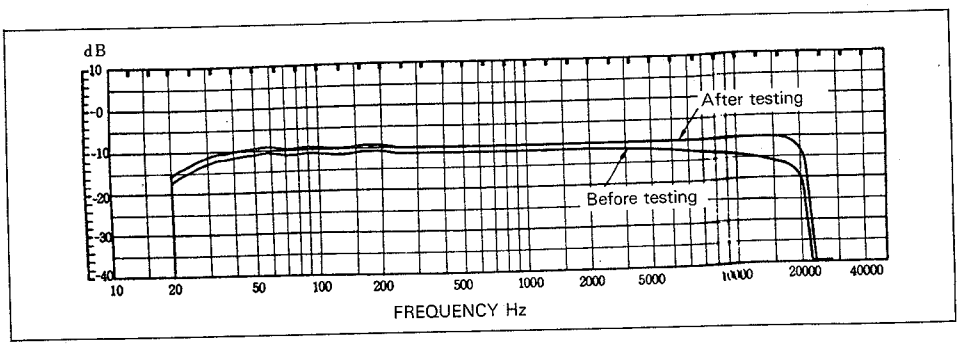


Fig. 5-2

Flat frequency response is obtainable with chrome, ferrichrome and Metal Tape after ATRS testing. Fig. 6 shows the characteristics obtained with HITACHI Metal Tape.

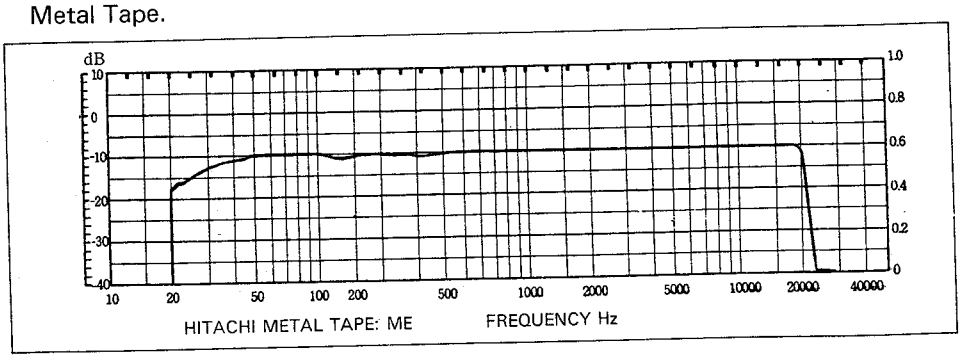


Fig. 6

- **Level variation**
  This new head has a hyperbolic shape so that the pressure of the tape against the head is concentrated between the recording and playback gaps; level variation is further improved by the DD dual capstan mechanism.
- **Wow and Flutter**
  With the new uni-torque direct drive motor employed in the D-3300M, a low wow and flutter of 0.023% is achieved.

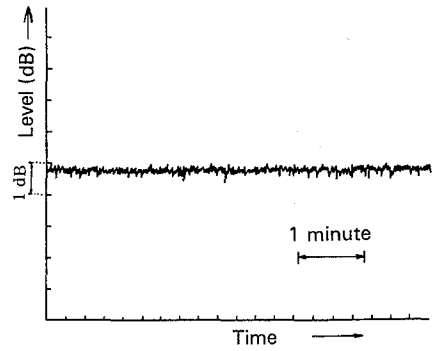


Fig. 7 Level variation

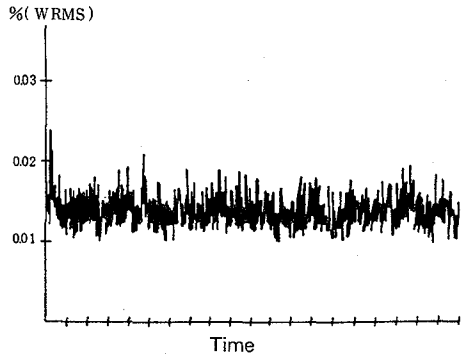


Fig. 8 Wow and flutter characteristics

- **Modulation noise**
  The new uni-torque motor, the dual motor mechanism, the innovative dual capstan drive, and the hyperbolic titanium melt/injection finish close gap metal R & P combination head combine to give the excellent modulation noise characteristics shown here.

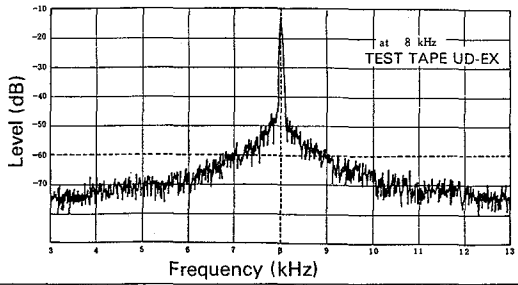


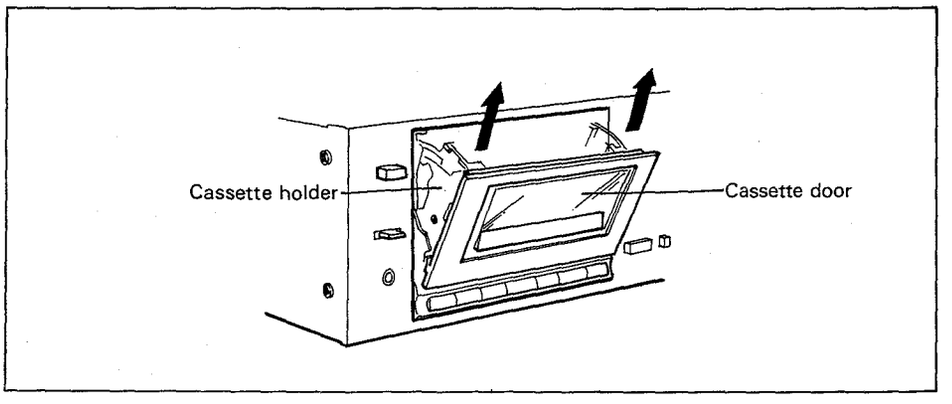
Fig. 9 Modulation noise

Cleaning the heads

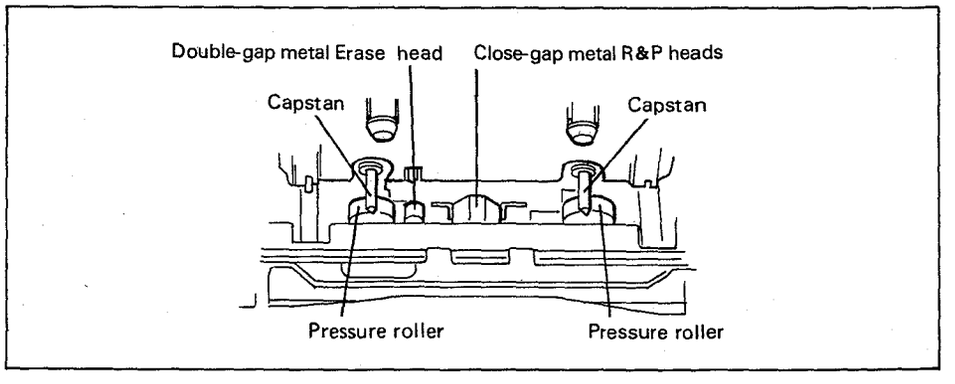
Almost of all phenomena which are thought of as malfunctions, such as "Reduce sound level", "Recording cannot be done properly", etc. are caused by dirt on the heads or pressure rollers.

Fine dust or magnetic powder adheres to the head as it is used and although it seems clean at a glance it is, in fact, dirty. Be sure to clean tape contact surfaces such as the head, capstans and pressure rollers after approximately 10 hours of operation. When Metal Tape is recorded and playback for several hours, the tape running surface must be cleaned.

Press the Eject button ⑮ so the cassette holder comes out towards you.



The cassette door can be removed by lifting it while holding both sides of the cassette door, which is conveniently cleaned with gauze, etc.



Impregnate the cleaning bar provided with cleaning fluid or alcohol and then clean the tape contact surfaces gently.

DEMAGNETISING THE HEAD

After the deck has been used for a long time the head becomes slightly magnetized and high frequencies may deteriorate or noise may be generated. In this case, demagnetize the head with a demagnetizer.

BEFORE CONSULTING A SERVICE ENGINEER

When the tape deck malfunctions, it is easy to assume that you should consult a service engineer. However certain malfunctions do not require this.
Check the following points before consulting an engineer.

Phenomenon	Point assumed to be malfunctioning	Countermeasures
The tape does not run	1. Faulty connection of the power plug. 2. The cassette is not loaded correctly. 3. A non-standard cassette is used. 4. It is in the PAUSE mode.	1. Insert the power plug correctly into the socket. 2. Re-insert the cassette. 3. Replace the cassette. 4. Press the operation button.
No sound	1. Connection between the unit and the stereo system is incorrect. 2. The Monitor switch ⑪ is set to "TAPE". 3. The Output level control ⑩ is set to minimum.	1. Check the connection. 2. Check Monitor switch ⑪ 3. Adjust Output level control ⑩.
Recording is not possible	1. The erasure-prevention tab of the cassette tape is removed. 2. The Recording level control ⑧ is set to minimum. 3. Connection between the deck and the stereo system is incorrect. 4. The head is dirty.	1. Replace the cassette tape or close the tab hole using plastic tape, etc. (Refer to "CASSETTE TAPES" on page 19) 2. Set Recording level controls ⑧ to match the input. 3. Check the connection. 4. Clean the head.
Sound distorted	1. The recording level is too high. 2. The Tape select button ㉛ is set incorrectly. 3. The head is dirty.	1. Set to the correct recording level using the recording level control ⑧ . 2. Set the button to the correct position matching the tape. 3. Clean the head.
Sound unstable or passages skipped	1. The tape is worn. Non-standard tape is used. 2. Tape contact surfaces are dirty.	1. Replace the cassette tape. 2. Clean the tape contact surfaces (the head, capstan, pressure roller, etc.).
High frequency response degraded	1. The head is dirty. 2. The Tape select button ㉛ is not set correctly. 3. Dolby noise reduction switch ⑫ is not set correctly.	1. Clean the head. 2. Set the button correctly to match the tape. 3. Set the switch to "ON" for Dolby NR tape, and to "OFF" for other tapes.
Erasing is not possible	1. The Recording level control ⑧ is not set to minimum. 2. The erase head is dirty. 3. The Tape select button ㉛ is not set correctly.	1. Set the Recording level controls ⑧ to minimum. 2. Clean the erase head. 3. Set the button correctly to match the tape.

Phenomenon	Point assumed to be malfunctioning	Countermeasures
Too much noise	1. The head is dirty. 2. The head is magnetized. 3. An electric blanket or a lighting dimmer is used near the deck.	1. Clean the head. 2. Demagnetize the head. 3. Move them away from the deck. When the noise persists, switch them off.
ATRS testing is not possible	1. Tested at the leader tape section. 2. Tape is badly worn. 3. The head is dirty.	1. Test at the center section of tape. 2. Replace the cassette tape. 3. Clean the head.
Mechanism stops during ATRS testing	1. The tape ends during testing and auto-stop operates.	1. Perform testing at the center section of the tape.
Battery indicator flashing	1. Memory back-up batteries exhausted.	1. Replace 2 G-13 silver oxide batteries.
After ATRS test tone is poor	1. The tape used for testing is not the same as the tape being used.	1. Test again with the tape being used.

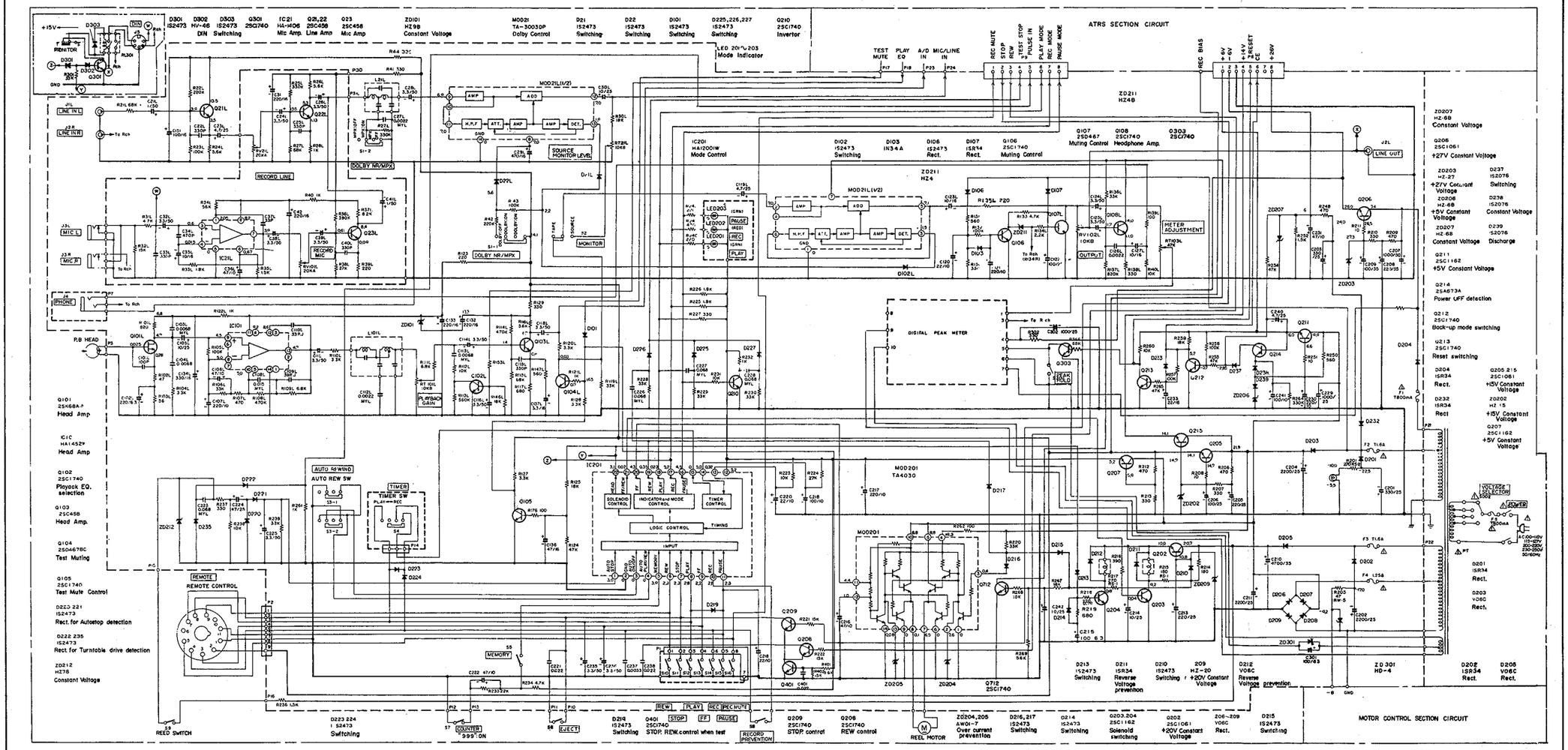
GENERAL INFORMATION

When you connect with other units which produce strong magnetic fields, hum may be induced in this unit, so stack the units with sufficient spacing between them. When there is slight bias leakage, noise may occur during AM reception. If this is the case, keep the unit as far from the tuner as possible.

SPECIFICATIONS

Power supply:	AC: 100 – 110V, 115 – 127V, 200 – 220V 230 – 250V, 50/60 Hz
Power consumption:	37W
Track system:	4-track stereo
Tape speed:	4.75 cm/sec
Tape:	Cassette tape (C-30, C-60, C-90)
Input impedance:	Microphone jack: 300Ω – 5 kΩ (Matching microphone) Input sensitivity: 0.5mV Input jacks: More than 100kΩ Input sensitivity: 85mV DIN jack: 4.7kΩ Input sensitivity: 0.5mV
Output load impedance:	Output jacks: More than 50kΩ DIN jack: More than 50kΩ , More than 470kΩ * Headphone jack: 8Ω – 2kΩ
Output level	775mV
Distortion ratio	1.0% (1 kHz 0 VU)
Frequency response:	MANUAL Normal: 20 Hz – 20 kHz (UD-ER C-90 tape) 30 Hz – 18 kHz* Chrome: 20 Hz – 22 kHz (UD-EX C-90 tape) 30 Hz – 19 kHz* Ferrichrome: 20 Hz – 20 kHz (FeCr tape made by S Ltd.) 30 Hz – 18 kHz* METAL: 20 Hz – 22 kHz (SCOTCH METAL TAPE C-60) 30 Hz – 19 kHz* ATRS The following performance is obtained with almost all tapes on the market at present. Normal: 30 Hz – 18 kHz (±3 dB) 40 Hz – 15 kHz (±1.5 dB) 20 Hz – 20 kHz* Chrome: 30 Hz – 20 kHz (±3 dB) 40 Hz – 15 kHz (±1.5 dB) 20 Hz – 20 kHz* Ferichrome: 30 Hz – 18 kHz (±3 dB) 40 Hz – 15 kHz (±1.5 dB) 20 Hz – 20 kHz* METAL: 30 Hz – 20 kHz (±3 dB) 40 Hz – 15 kHz (±1.5 dB) 20 Hz – 20 kHz*
Recording system:	105 kHz AC bias
Erasing system	AC erasing
Wow & flutter:	0.023% (WRMS), 0.09%*
S/N ratio:	Dolby NR "OFF": 60 dB (A weighted, Reference 3% T.H.D. METAL tape) 60 dB* Dolby NR "ON": 69 dB (A weighted, Reference 3% T.H.D. METAL tape) 69 dB*
Crosstalk:	More than 65 dB (1 kHz)
Erase ratio:	More than 65 dB
ICs	20
FETs	2
Transistors	71
Diodes:	85

SCHEMATIC DIAGRAM



Varistors:	2
LEDs	15
Microcomputers:	1
Motors:	Uni-torque DD motor, DC motor
Heads:	Recording head } New Close gap METAL R&P head Playback head } Double-gap METAL Erase head (permalloy)
ATRS specification:	Microcomputer used: 4-bit 1-chip microcomputer Bias variation steps: 32 Sensitivity & Equalization adjustment steps: 32 each (variable by 0.25 dB per step) Batteries used (for memory protection): Silver oxide battery (G-13) x 2
Max external dimensions:	435(W) x 165(H) x 256(D) mm
Weight:	8.7 kg

***According to DIN 45 500**

This specification and schematic diagram may be changed for improvement of performance without notice.

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